

# Chlorophyll *a* Pigment Concentration

## Product Description

This is a Level 2 and 3 product which contains ocean chlorophyll *a* pigment concentration for Case 1 waters (Parameter 2571) and Case 2 waters (Parameter 2569) at 1-km resolution. It is produced daily at Level 2 and 3 and weekly at Level 3. Absorption parameters generated by the chlorophyll algorithm are also provided as interim product MOD 36 Total Absorption (Parameter 3206) which includes absorption due to water, phytoplankton, detritus and gelbstoff, and gelbstoff absorption only (Parameter 5362). Valid data exists only for ocean cloud-free pixels and the weekly composite will be an average of cloud-free acquisitions for each ocean pixel.

## Research & Applications

Chlorophyll *a* concentration is a key input to the primary ocean production product (MOD 27) and is used to trace oceanographic currents, jets, and plumes. The product provides the concentration of Case 1 chlorophyll in sea water (water that has optical properties which are dominated by chlorophyll and associated covarying detrital pigments) and in Case 2 waters (which are waters

**MOD 21, MOD 36  
PRODUCT SUMMARY**

**Coverage:**  
global ocean surface, clear-sky only

**Spatial/Temporal Characteristics:**  
1 km/daily, weekly

**Key Science Applications:**  
ocean productivity, bio-optical properties

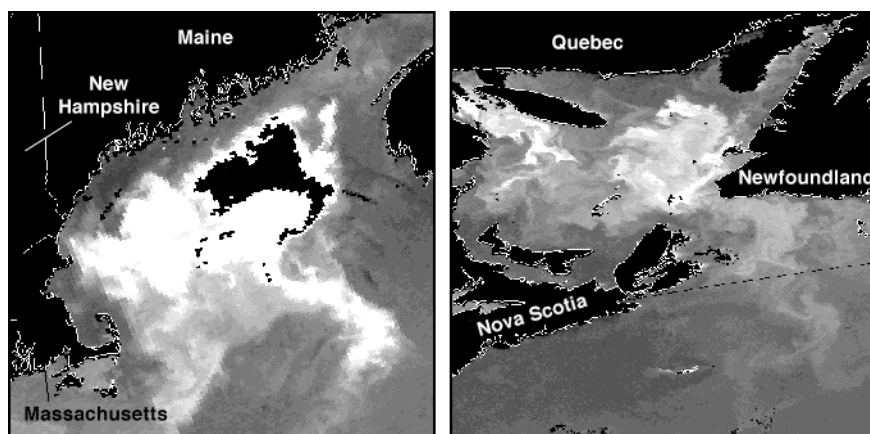
**Key Geophysical Parameters:**  
Case 1 and 2 chlorophyll *a* concentration, absorption coefficients

**Processing Level:**  
2, 3

**Product Type:**  
standard, at-launch

**Science Team Contact:**  
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that contain substances which affect optical properties but do not covary with chlorophyll, such as gelbstoff (marine chromophoric dissolved organic matter [CDOM] substance which absorbs at 400 nm), suspended sediments, cocolithophores, detritus and bacteria). The algorithm derives from extensive research using CZCS data in which good performance was obtained for Case 1 waters and has evolved to perform successfully for the Case 2 waters for the MODIS algorithm. The 1-km resolution and nearly daily coverage will allow the observation of mesoscale oceanographic features in coastal and estuarine environments which are of increasing importance in marine science studies.



**Figure 38.** Satellite ocean color imagery, in addition to allowing the concentration of single-celled plants to be remotely measured, permits the detection and identification of certain algal blooms. The above images, taken by the Coastal Zone Color Scanner sensors, are of the Gulf of Maine and Gulf of St. Lawrence. The white to light grey waters in both regions are blooms of a single type of algae (called coccolithophores) which affect regional climate and fisheries.

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## *Data Set Evolution*

The product algorithm is based on a semi-analytical, bio-optical model of remote sensing reflectance which uses Water Leaving Radiance (MOD 18), PAR (MOD 22), and Absorption Coefficient (MOD 36). The model is inverted to obtain the absorption coefficient due to phytoplankton at 675 nm and chlorophyll *a* concentration is derived from this coefficient. The algorithm will be thoroughly tested during the SeaWiFS project and post launch validation will be conducted using data from instrumented collection cruises through ocean test sites including the nine used for algorithm development. Also, hyperspectral data from will be used to simulate the 10 nm bands and produce comparison results.

## *Suggested Reading*

- Austin, R.W., 1974.
- Carder, K.L., *et al.*, 1986.
- Carder, K.L., *et al.*, 1991.
- Holm-Hansen, O. and B. Riemann, 1978.
- Lee, Z.P., *et al.*, 1995.
- Smith, R.C. and K.S. Baker, 1982.